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DEPARTMENT OF AGRICULTURE

BUREAU OF
ENTOMOLOGY AND PLANT QUARANTINE
NEWS LETTER

VOLUME IV

[illegible]

OBITUARIES

Gersham Franklin White

Gersham Franklin White, senior pathologist of the Bureau of Entomology and Plant Quarantine, died suddenly of a heart attack at Moorestown, N. J., on April 27. Dr. White had been with the Department since 1906 and had been stationed in Washington most of the time. He was a world authority on diseases of insects and had published many articles on bacterial diseases of honeybees and other insects. A few years ago he perfected methods of rearing sterile maggots for surgical use. At the time of his death he was assigned to the Moorestown, N. J., laboratory to investigate the control of the Japanese beetle by means of diseases.

Dr. White was born at Hooksburg, Ohio, on December 22, 1873. He was graduated from Ohio University in 1901. He received his Ph.D. from Cornell University in 1905, and his M.D. from George Washington University in 1909. Dr. White was a World War Veteran, having served for 2 years as Captain in the Medical Corps. Funeral services will be held in the Fort Myer Chapel at 2:30 p.m. Friday, April 30. Interment will be in Arlington Cemetery.

Leslie A. Roberts

Leslie A. Roberts, inspector of the Division of Foreign Plant Quarantines, stationed at New Orleans, La., died on April 17, 1937, of acute bronchial pneumonia. After graduating from Texas A. & M. College in 1926, Mr. Roberts served for a number of years on the pink bollworm project in Texas and later entered foreign plant quarantine work, serving for various periods at El Paso, Tex., Columbus, N. Mex., Houston, Tex., and New Orleans, La. He is survived by a widow, Mrs. Margaret B. Roberts, and one son, Leslie Adrian.

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UNITED STATES DEPARTMENT OF AGRICULTURE

BUREAU OF ENTOMOLOGY AND PLANT QUARANTINE

NEWS LETTER

FOR MARCH 1937

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PRESENCE OF INSECTS AND CHEMICALS CAUSES FOOD ARRESTS

In a recent release from the Federal Food and Drug Administration are several notes involving insects. Among these were 915 cases of canned peas seized because of infestation with pea weevil, 1,700 pounds of almonds seized as worm-eaten, 2,514 cases of tomato paste, catsup, and soup, containing insect fragments, 25 bushels of apples bearing arsenate and lead residues, and 543 sacks of lima beans containing lead. Cases resulting in fines have been terminated involving insect-infested and wormy raspberries and canned spinach containing worms.

ROOF-GARDEN LABORATORY FOR STUDYING INSECTS AND SOILS

On the roof of one of the wings of the South Building of the Department in Washington, D. C., seven floors above the street, two glassed-in laboratories or penthouses for research by scientists have been completed recently. The first, which was completed last fall, is being used by plant specialists as an experimental greenhouse. The second will be used for studying insect pests and specially treated soils, work for which fresh air and sunshine are necessary. One compartment of the new penthouse is reserved for rearing unidentified insect pests. It has double doors, double screening, and extra strong glass so that no insect can escape. Bolts and locks keep out intruders. The characters by which many kinds of insects may be identified are known only for the adult stage. It is impossible to identify the immature stages. When living specimens of grubs or other immature stages belonging to groups that cannot be classified are submitted for identification, it is proposed to cage them so that they can complete their development, making adults available for study. After getting specific approval, entomologists and plant quarantine inspectors may forward insects in their immature stages in tightly sealed containers to Washington, where they will be reared under these strict quarantine conditions for identification. The association of the immature stages with the adults will give the entomologists knowledge that will aid in combating insect pests and in the enforcement of plant quarantines.

Next door to this quarantine room are two compartments used for the study of such insects as mosquitoes, ticks, and lice, which attack and annoy man and animals. These compartments also are secured against escape of insects and against intrusion. Most of these parasites require blood on which to feed and develop, and suitable animals--mice, guinea pigs, and rabbits--are provided for this purpose. Two problems that will receive early attention are studies on the habits and development of wood ticks, because of their relation to Rocky Mountain spotted fever, and studies on species of mosquitoes suspected of carrying encephalomyelitis of horses. The investigations will not include studies on the disease organisms carried by these insects and every effort will be made to exclude insects infected with them.

FRUIT INSECT INVESTIGATIONS

Saw-toothed grain beetle in raisins on ranches.--According to data obtained by H. C. Donohoe, of the Fresno, Calif., laboratory, 6 lots of samples of Thompson Seedless raisins, of a total of 14 lots taken on ranches after harvest in 1936, contained adults of Oryzaephilus surinamensis L. Before screening with an improved motor-driven raisin cleaner, the 6 lots of fruit contained from 74 to 253 beetles per ton; after cleaning there were from none to 156 per ton. This is the first record obtained by Mr. Donohoe of the saw-toothed grain beetle in new-crop raisins on ranches. Since all of the raisins sampled had been stored in farmyards for various periods before they were cleaned, the place of origin of the infestation, whether in the vineyards or in the farmyards, was not determined.

Work on Japanese beetle in outer zone of spread.--James F. Cooper, formerly connected with the Division of Fruit Insect Investigations, but who has been engaged in work for the Florida State Plant Board at Key West for the past 2 years, has been reinstated in the Bureau, effective April 15, for work on the Japanese beetle in the outer zone of spread.

Effect of particle size of acid lead arsenate on its insecticidal action in soil.--W. E. Fleming, of the Japanese beetle laboratory at Moorestown, N. J., has completed tests to determine the effect of particle size of acid lead arsenate on its insecticidal action against Japanese beetle larvae in soil. Through the cooperation of the Division of Insecticide Investigations, a sample of ordinary commercial acid lead arsenate was reground, alone and with 2 percent of gum arabic, in a commercial mill, and the percentage of particles of different sizes in these samples determined by sedimentation analysis. The samples were shaken with dry sand and added to sassafras sandy loam at rates of 500, 1,000, 1,500, and 2,000 pounds per acre to determine the survival of larvae in the soil. The reground material was definitely finer (than the ordinary material) but no definite correlation was apparent between the insecticidal action and the fineness of the particles. The results showed definitely that the amount of acid lead arsenate applied is far more important than the size of the particles and that when the material is applied at the standard rate of 1,500 pounds per acre the ordinary form and the reground form are equal in insecticidal action.

Effect of acid lead arsenate on different plants when applied to soil about their roots.--W. E. Fleming has completed a summary of the effect of acid lead arsenate on different plants when applied to soil about their roots for destruction of larvae of the Japanese beetle. In this summary the reaction of 492 varieties of evergreen, deciduous, and perennial plants to the treatment is reported. In those treatments where acid lead arsenate is applied to reduce the larval population to prevent injury to the plants, observations have been made on 16 varieties of evergreen seedlings, 31 varieties of vegetables, 11 varieties of grasses, and 18 varieties of weeds. It has been noted that the reaction of most plants to acid lead arsenate in the soil appears to vary with the chemical and physical properties of the soil, with the age and vigor of the plants, and with the nature of the development of the roots. Plants tolerate large quantities of arsenic in soils that convert the material rapidly into an insoluble form. Seedlings appear to be more susceptible than mature plants and unhealthy plants are more easily injured than vigorous plants. Plants that develop strong tap roots or deep penetrating roots generally grow well in spite of acid lead arsenate in the upper layer of soil, but those which develop delicate primary roots confined largely to the treated layer are often retarded or even killed by arsenic in the soil.

MEXICAN FRUIT FLY CONTROL

The fruit fly situation in the lower Rio Grande Valley.--The harvesting season for the shipment of Texas citrus closed at midnight on March 31. Through that date 23,087 equivalent carloads had moved from the beginning of the season. There remain in packing sheds and cold storage approximately 350 more cars to be moved. Larval infestations developed at an alarming rate during the month and it was necessary to restrict the movement of fruit to certain designated northern markets whenever an infestation was found. In addition to this precaution, every effort was made to so thoroughly inspect the fruit that the chances of shipping infested fruit were reduced to a minimum. The fruit flies identified in March were as follows:

Species taken	Texas	Mexico
Adults	*Number*	*Number*
Anastrepha ludens Loew	296	2
Premises	131	2
A. serpentina Wied	1	0
Premises	1	0
A. acidusa Walk	3	0
Premises	3	0
A. sp. "X"	1	0
Premises	1	0
A. sp. "Y"	43	2
Premises	40	2
A. pallens Coq	235	1
Premises	70	1
Anastrepha sp	1	0
Premises	1	0
Toxotrypana curvicauda Gerst	10	0
Premises	9	0
Miscellaneous	1	0
Premises	1	0
Total specimens	591	5
Larvae		
A. ludens	11,646	*928
Miscellaneous	20	0
Pupae		
A. ludens	28	0
Premises	17	0

*All from market fruit.

CEREAL AND FORAGE INSECT INVESTIGATIONS

Wheat stem sawfly gradually replacing black grain stem sawfly in eastern Pennsylvania.--According to E. J. Udine, of the Carlisle, Pa., laboratory, as *Cephus pygmaeus* L. has spread into eastern Pennsylvania it has gradually driven out *Trachelus tabidus* F., which has been established for many years in that part of the country.

No immunity to straw worm shown in common wheats in California.--W. B. Cartwright, Sacramento, Calif., reports that field tests at Birds Landing, Calif., of 300 wheat varieties to straw worm were completed in March and all varieties tested were found to be susceptible. The extremely early varieties Sunset and Ramona in previous tests had moderately low infestations but have this season been eliminated as possibly resistant varieties. Of special interest were three solid-straw strains found to be susceptible. Of the experimental wheats, Einkorn and *Triticum timopheevi* and the wheat-rye amphidiploid C. I. 11403 remain uninfested and continue to be of interest as possibly immune lines.

Hessian flies from California and Indiana vary in ability to infest wheats.--C. M. Packard, Lafayette, Ind., reports that results of greenhouse experiments show wide differences between the California and Indiana flies in their ability to infest Dawson, Illinois No. 1 W 38, Fultz, and Big Club wheats. These results support the theory that there are different races of flies in different regions, which must be considered in the breeding of fly-resistant wheats for those regions. Crosses of California and Indiana flies were fertile in some cases but not in others. In one test progeny matured successfully in Big Club wheat but not in Fultz. These experiments have been discontinued until next winter, as the stock of California flies has been destroyed to prevent any danger of infestation in the field with the advent of spring.

Temperature of flour is important factor in vacuum fumigation with hydrocyanic acid.--R. T. Cotton reports from Manhattan, Kans., that vacuum fumigation experiments with hydrocyanic acid indicate that the same difficulties are experienced with the use of this fumigant for the treatment of cold flour as with other fumigants. For a 1-hour exposure a dosage of 20.8 ounces of HCN per ton of flour had no effect on adults of the flour beetle buried in flour having a temperature of 51.8° F. By extending the period of exposure to 3 hours, however, this dosage gave a complete kill, indicating that diffusion of the gas through the flour eventually takes place. A 13-hour exposure with a dosage of 1.04 ounces per ton of flour did not give a complete kill of flour beetle adults in flour having a temperature of 53.6°.

Application of carbon disulphide-carbon tetrachloride mixture to surface of grain bin satisfactory under high temperatures.--Mr. Cotton reports from Manhattan that experiments to determine the feasibility of fumigating large elevator bins by applying carbon disulphide-carbon tetrachloride mixture to the surface of the grain has indicated that penetration to the bottom of the bins can be obtained when the mixture is applied entirely to the surface of the grain, provided the temperature of the grain is favorable. Apparently in grain that is cold the penetration of the fumigant is slowed up so that satisfactory results are not obtained. In one test in a bin 60 feet deep and having a capacity of 6,000 bushels, 6 gallons of the mixture applied to the surface of the grain, at a temperature of 92° F., gave an average kill of 86 percent of rice weevils in an exposure of 72 hours. This may be compared with the results obtained in a similar bin when 7 gallons was used with a temperature of 76°, where the average kill of rice weevils was only 58 percent. It would seem that recommendations as to the method of application of the grain fumigants of the nature of carbon disulphide-carbon tetrachloride mixture should be based on the temperature of the grain. With cold grain the fumigant should be applied directly to the grain stream as the bin is filled, whereas with warm grain it may be applied to the surface of the filled bins.

JAPANESE BEETLE CONTROL

Special elm sampling in 40- to 80-mile zone.--From about February 15 to March 15 eight special scout crews were assigned to the collection of specimens from trees in the area between the 40- and 80-mile radius lines from the center of the infected area. Devitalized or otherwise abnormal elms were sampled at approximate 5-mile intervals. If trunk or twig discoloration or bark beetle galleries were found, specimens were collected for culture tests to determine presence or absence of *Ceratostomella ulmi*. This resulted in the collection of specimens from 661 trees. Owing to scarcity of elms on Long Island and in southern New Jersey in the 40-80 mile zone, the survey was concentrated in a semicircle northwest of an arc through New Haven, Conn., and Camden, N. J. About 7,500 square miles were scouted in this manner. Specimens collected averaged one per 11 square miles. About 1,500 square miles of the surveyed area are within the present infected limits. Of the 661 specimens, 42 were taken in Connecticut, 148 in New Jersey, 313 in New York, and 158 in Pennsylvania. Thus far, laboratory culturing has resulted in the determination of Dutch elm disease fungus in only one tree, an elm located inside the New Jersey infected zone. Bark-beetle galleries were cultured by a special laboratory technique, but no disease fungus has been isolated. This type of scouting may be enlarged during the foliage season to supplement the systematic scouting and autogiro observations made in the 10-mile protective band surrounding infected territory. The greatest value of this type of work is the check that it gives on conditions in the zone from 60 to 80 miles from the infection center.

Elm-sanitation work progressing rapidly.--Initial work orders were issued late in March for removal of dead and dying trees in Bronx County, N. Y. Work of Federal sanitation crews in Rockland County neared completion, except in localities where the water was too deep for work. Instructions were issued for the starting of clear-cutting operations on the eastern slope of Bear Mountain. Sanitation work continued at a rapid rate in Putnam County. As the clean-up work in upper Westchester County neared completion, crews were shifted to lower Westchester County, where the work is scheduled for completion by early May. Sanitation work in New Jersey was complete, with the exception of a large number of dead and dying trees to be removed in connection with clear-cutting operations, plus the devitalized trees in areas assigned to the three New Jersey C. C. C. camps and in the Sussex County areas where completion of elm sanitation is impracticable.

Embargoed elms returned to infected zone.--Upon learning on March 30 that seven American elms of 6-inch caliper, 20 to 25 feet high, had been loaded at a Westchester County, N. Y., nursery and were en route to the Mount Vernon Memorial Highway, Alexandria, Va., immediate arrangements were made with the Washington inspection office to intercept these trees upon their arrival and order their return to the Dutch elm disease infected area. This timely interception prevented the movement of 20 trees that were involved in this order for elms to border the Memorial Highway. Upon return to the infected area the nursery disposed of the elms to a private estate at a reduced price. A New York City landscape contracting firm was responsible for the movement of the elms contrary to the embargo on this species from infected sections.

Dutch elm disease accomplishments.--With a maximum personnel of 2,604 W. P. A. workers, 611 C. C. C. enrollees, 122 W. P. A. appointees, and 63 Federal and State appointees, sanitation crews were able to remove 72,771 dead and devitalized elms. Crews working in areas to be made elm-free accounted for an additional 80,187 elms of all sizes and conditions of vigor. Twenty-eight trees were confirmed as infected with the disease, bringing the total confirmations to March 31 to 21,932. Eradication of 38 confirmed trees left standing only 2 known infected elms. Elms treated with copper sulphate in connection with the tree-medication program to render areas elm-free numbered 36,910.

C. C. C. camp discontinued.--All arrangements were made late in March for the abandonment on April 1 of C. C. C. Camp P-104 located at West Haverstraw, Orange County, N. Y. This camp had been assigned exclusively to Dutch elm disease control in a tier of areas lying along the Rockland-Orange County line, comprising principally the Palisades Interstate Park, together with a second tier of mountainous areas along the New Jersey line in the southeast corner of Orange County. There still remain five C. C. C. camps engaged in Dutch elm disease work--three in New Jersey, and one each in Connecticut and New York.

Trunk sampling in Connecticut swamp area.--Connecticut crews were assigned to trunk sampling of all elms in the Tamarack Swamp near Greenwich, where the greatest concentration of Dutch elm disease infection in the State was found during the past summer. This work was practically completed at the end of the month. A number of infected trees were located through this work. This out-of-season scouting was designed to locate all infections present, so that the trees might be eradicated prior to emergence of the insect vectors of the disease.

State cooperation in Japanese beetle control.--Advices have been received from L. A. Moore, superintendent, division of plant industry, Illinois department of agriculture, that an appropriation of $4,200 has been made available for Japanese beetle trapping in that State for the fiscal year starting July 1, 1937. E. N. Cory, State entomologist of Maryland, has notified the Bureau that that State will have $40,000 available for the fiscal year beginning October 1, 1937, and the same sum the following year, for control work on the Japanese beetle. An additional Maryland emergency appropriation of $15,000 is also available this year for the extra inspection work entailed by the finding of beetles on some of the farms growing strawberry plants on the Eastern Shore and any possible emergency that may arise in connection with large-scale inspection of beans this summer. On March 22 E. H. Hanefeld, director of agriculture, Ohio department of agriculture, approved the first Japanese beetle quarantine to be issued by that State.

Getting the beetles through.--A severe snowstorm on March 15 for awhile threatened to interfere with the delivery to the Division of Insecticide Investigations of a quantity of adult Japanese beetles collected in rose-growing greenhouses in the Philadelphia district. An inspector from the Philadelphia office set out with 330 adults for the Conowingo Dam, near the Maryland State line, where he was to be met by an inspector from the Baltimore office, who in turn was to deliver the beetles to the experimental workers in Washington. Upon reaching Oxford, Pa., the driver found the roads drifted and traffic blocked by a bus stuck in a drift. By telephoning the State police station at Conowingo, the Maryland inspector was notified to drive up to the end of the stalled line of traffic. The exchange was made on foot and the beetles were safely delivered to the men who are making preseason tests in an endeavor to work out a fumigant which may be substituted for the mechanical inspection of string beans.

Half of 1 percent for quarantine.--According to an item appearing in Horticultural Topics, a monthly bulletin of the New Jersey Association of Nurserymen, the total nursery area in the State amounts to 6,037 acres. The item further states that over $5,220,000 is invested in land and buildings, and that an annual business of $4,410,729 is transacted, with a profit of $769,218. Approximately $26,000 of Federal funds and $30,000 of State funds is allotted to Japanese beetle quarantine enforcement in New Jersey. About 25 percent of the Federal allotment is devoted to farm-products inspection during the summer months. The actual Federal expenditure for nursery and greenhouse supervision and scouting of commercial establishments is therefore less than 0.5 percent of the nurserymen's gross sales and 2.6 percent of the net profits. Expenditure of these small percentages assures the nurserymen of access to markets in all parts of the United States.

Newly regulated area surveyed.--Contact visits were made to all commercial plant shippers in areas added to the Japanese beetle regulated zone with the revision of the quarantine effective March 1. In Ohio 14 establishments applied for classification, whereas 57 indicated their need for occasional inspection and 100 others were found to do only a local business. Of 70 establishments visited in the new West Virginia area, 26 have been assigned a preferred status of classification. Several establishments were added to the classification list in the few Maryland election districts added to the regulated area. Maps, regulations, or quarantine shipper's guides were left at all places contacted, and the establishments were thoroughly instructed in quarantine procedure. Shippers applying for classification were further instructed in the use of certificates and report forms.

Extra inspectors added.--To cope with increased demands for inspection of strawberry plants, the force of temporary inspectors working from the Salisbury, Md., office was increased to five. One inspector was added for full-time duty at a Willards, Md., establishment. An additional man was employed and stationed at a nursery at Towson, Md. Seven temporary inspectors were hired in New Jersey during the month, six on the State payroll and one on the Federal per diem roll. On March 25 a temporary inspector was assigned to duty on Long Island to assist the regular inspectors stationed on the island. Work in the Pittsburgh district also required the employment of another temporary inspector.

Flower-show supervision.--Inspectors from the New York and Philadelphia field offices checked on the receipt and dispatch of stock at the International Flower Show at Grand Central Palace from March 15 to 20, and at the Philadelphia Flower Show held in the Commercial Museum from March 8 to 14. A violation of quarantine no. 63, involving the unauthorized movement of five white pine trees from New Jersey to New York City, was noted by the New York inspectors.

Heated soil brings out adult.--One adult Japanese beetle was collected in the yard of the Frankford Arsenal, Philadelphia, Pa., on April 1. The adult, together with a two-spotted lady beetle, was found crawling on the grass growing over an underground line of steam pipes.

Hundreds of egg clusters removed from inspected lumber.--Inspection of 12 truck loads of lumber at Amherst, Mass., resulted in the creosoting and removal of 304 gypsy moth egg clusters. The lumber was destined to Avon, Conn. Lesser infestations were found in 28 other shipments inspected. From these 76 egg masses were removed.

FOREST INSECT INVESTIGATIONS

Black Hills beetle becomes more cold-hardy under winter conditions.--Recent low-temperature tests with the Black Hills beetle (Dendroctonus ponderosae Hopk.) by N. D. Wygant, of the Fort Collins, Colo., field laboratory, reveal that the larvae under winter conditions may survive very low temperatures. The critical range of larvae from ponderosa pine during the latter part of October was from -2.5° to -10° F., whereas by the first of February mortality did not start until -20°, and at -35°, the lowest temperature reached, there was 34-percent survival. Experiments are now in progress to determine whether or not these surviving larvae are able to develop normally. The larvae from ponderosa pine during mid-March had a critical range similar to that during early February, but the larvae from limber and lodgepole pine had lost some of their cold-hardiness by mid-March and mortality started at a higher temperature. All material was stored in the same place and was therefore subjected to identical outdoor temperatures, previous to the tests. There were several days of warm weather early in March and it is possible that activity started in the thin-barked hosts, lodgepole and limber pine, which resulted in some of the larvae losing their hardiness and being killed at higher temperatures. The tests were made with naked larvae taken from infested logs stored in the woods and exposed in a low-temperature cabinet. Samples of 50 larvae each were exposed for 2 hours and 15 minutes at each 2.5° interval over the critical range.

Black Hills beetle epidemic on Enos Mills homestead.--Mr. Wygant also reports a concentrated attack of the Black Hills beetle in ponderosa pine on the original homestead property of the late Enos Mills, famous naturalist, in the vicinity of the Rocky Mountain National Park, Colo. The infestation on this property covers an area of approximately 15 acres and contains nearly 500 infested trees of all susceptible sizes, some with a stump diameter of 4 feet. The attacked trees occur in large groups, one group including over 100 trees. This epidemic adjoins the Rocky Mountain National Park and the Roosevelt National Forest, Colo., both of which contain additional infestations. Control operations, covering the entire unit, are being carried out by the Forest Service and Park Service.

Number of instars for larvae of Dendroctonus monticolae Hopk.--Studies made during the 1936 field season by G. R. Struble, of the Berkeley, Calif., laboratory, indicate that, during the course of development of D. monticolae larvae in sugar pine, there are four instars. Head-capsule measurements were made in February on 420 larvae. These were collected during July and August, 1936, at 2-day intervals throughout a period of 6 weeks. The measurements revealed four distinct groupings with 80, 76, 137, and 127 larvae in each group. To supplement these findings and to determine the period of each instar, six newly hatched larvae were planted in February to fresh ponderosa pine phloem inside glass tubes, and were held in rearing at room temperatures around 70° F. Fresh phloem was provided every other day, when examinations were made for shed skins. Four definite instars were found with periods of 5, 6, 4, and 16 days, respectively, for each.

Effects of low temperature on larvae of Melanophila californica Van Dyke.--A small series of tests of the effect of low temperatures on prepupal larvae of M. californica was made by A. S. West, Jr., of the Berkeley, Calif., laboratory, in January. The larvae used were contained in the bark of logs that had been stored outdoors at Berkeley since mid-October 1936, and were subjected to air temperatures below freezing (minimum of 28° F.) during January. Prepupal larvae in pill boxes were exposed for 2-hour periods to temperatures ranging from zero to -15°F. Mortality ranged from 6 percent at -5° to 25 percent at -15°. Increasing mortality was found at 2.5° intervals below -5°, with the exception of a mortality of 30 percent at -7.5°. Two lots of larvae in which no mortality occurred with exposure to a temperature of zero were subsequently exposed at -15° with resultant mortalities of 38 and 50 percent. In one test of larvae that had not yet reached the prepupal stage, 20 percent mortality occurred at zero, and 63 percent mortality when the same larvae were subsequently exposed at -15°. Surviving larvae used in these tests were set aside at room temperature and, beginning the middle of March, a number of these larvae have pupated. Pupae have developed in each lot of prepupal larvae, even though many of the individuals were frozen solid at temperature below -5°. Pupation also occurred in check lots at room temperature.

Winter survival of locust borer larvae in Ohio.--R. C. Hall, of the Columbus, Ohio laboratory, reports that sampling of the locust borer population was made in March at Minerva, Hopedale, and Cambridge to determine winter survival with the following results: Minerva, 86.6 percent survival; Hopedale, 86.6 percent; and Cambridge, 86.5 percent. This represents a much higher survival for the mild winter of 1936-37 than for the extremely cold winter of 1935-36.

Insects concerned in decadence and death of chestnut oak.--H. J. MacAloney, of the New Haven, Conn., laboratory, reports as follows on an examination of dying chestnut oak on the Black Rock Forest, Cornwall-on-Hudson, N. Y., on March 27: "The general decadence and death of many trees of this species in this area is apparently due to a complex of factors, chiefly moisture deficiency and attacks by the golden oak scale (Asterolecanium variolosum Ratz.), the various cankerworms, and the two-lined chestnut borer (Agrilus bilineatus Web.). Precipitation records from the West Point Weather Station, about 4 miles distant, show an aggregate minus departure of approximately 48 inches since 1924. It is believed that this is the primary cause of this decadence. The Black Rock Forest is pursuing a policy of gradually eliminating the chestnut oak from the stands on the forest because of this decadence."

Laboratory studies on spruce sawfly.--Mr. MacAloney also reports on feeding experiments with the European spruce sawfly: "A laboratory experiment initiated in November 1936 and carried through the winter shows that the white, Colorado blue, and Koster spruces are more favorable for oviposition than Norway, black, and red spruces. The red spruce, as has previously been reported from Canada, is the least favorable of all, probably because of the more compact and close arrangement of the needles around the twig, making it difficult for the female to arch her back while preparing the egg-niche. There is evidence that the young larvae prefer Norway and white spruce needles and in some cases they actually migrated from the Colorado and Koster needles when one or both of the other species were present in the same cage. Mortality is heavy in the first two instars. Once these are passed, the larvae grow more vigorously on the needles of the white and blue spruces and develop to the cocoon stage more rapidly than on the other species tried. In a chamber where the temperature remained constant at 70° F. and where the humidity remained fairly constant from 50 to 65 percent, it was possible to cause complete development, from egg to adult, in about 6 weeks. A detailed report on this project is being prepared."

Mountain pine beetle infestation, Kaniksu National Forest.--During the last week of March T. T. Terrell, of the forest-insect laboratory, Coeur d'Alene, Idaho, made an examination of a mountain pine beetle infestation in the white pine stands of the Smith Creek drainage, Kaniksu National Forest. Mr. Terrell was accompanied on this examination, which required several days of difficult field work, by Corland James, of the Kaniksu forest office. Data obtained from this examination indicate an area of approximately 2,500 acres of mature white pine, with an infestation of 0.24 tree per acre, or a total of 614 infested trees. It is estimated that the attacks of these insects in 1936 destroyed more than 1 percent of the total volume of the stand and, as the overwintering broods of beetles were in a healthy condition at the time of the examination, an increase in the severity of the infestation can be expected during the coming season. Infestations of this intensity are above normal and, if allowed to proceed unchecked, will develop into serious epidemics resulting in the destruction of a large percentage of the timber stand. Owing to conditions encountered during this survey, control measures have been recommended, to be instituted as early in the spring of 1937 as conditions will permit.

Status of mountain pine beetle infestation in lodgepole pine on sample strip of Targhee National Forest.--On a strip 4½ miles long and 1 chain wide on the Targhee National Forest, Idaho, examinations made by A. L. Gibson, of the Coeur d'Alene, Idaho, laboratory, in 1935 and 1936 indicated the status of the mountain pine beetle infestation to be as follows:

Year	Total trees attacked	Trees killed by--				Trees green-sided from, or that have pitched-out mountain pine beetle attack	
		Secondary bark beetles		Mountain pine beetle			
	Number	Number	Percent	Number	Percent	Number	Percent
1935--	479	5	1.0	240	50.1	234	48.9
1936--	252	77	30.6	57	22.6	118	46.8

From the preceding data it may be seen that not only was the total number of attacked trees in 1936 only slightly over half the number attacked in 1935, but the mountain pine beetle killed only 57 trees in 1936, which is less than one-fourth as many as the 240 killed in 1935. The number of trees in 1936 that have overcome bark beetle attack on all but one side or have repelled their attack by a heavy flow of pitch total but one-half of those similarly affected the preceding year, although their proportion to the total kill remained about the same. In addition to the number of trees attacked being fewer in 1936, the average infested length was observed to have been shorter. Irrespective of this last difference, we find the number of trees attacked by the mountain pine beetle in 1936 to have been but 37 percent of the number hit the previous year. It is believed that the decrease noted on this strip is fairly representative of conditions over the entire forest.

GYPSY MOTH AND BROWN-TAIL MOTH CONTROL

Progress of gypsy moth project.--About 2,165 W. P. A. workers were employed on gypsy moth work at the end of March. Since July 1, 1936, the men have destroyed a total of more than 1,789,000 egg clusters. They have scouted nearly 2,284,000 acres and over 9,400 miles of roadsides. More than 6,600,000 trees in open country were examined.

Tree workers visit Greenfield office.--On March 26 the gypsy moth office in Greenfield, Mass., was visited by about 35 men, who had been attending a short course for tree workers at the Massachusetts State College.

Some of the men were town or city tree wardens and others were local gypsy moth superintendents. The different phases of gypsy moth work were explained, some of the problems were discussed, and they were given an opportunity to observe the methods employed in storing and handling various kinds of equipment at the shop and in the plants.

Equipment being made ready for spraying.--Preparations are being made for the opening of the spraying season, which normally begins between the middle of May and the first of June. Tests of new high-pressure spraying machines are being conducted; old equipment is being repaired and reconditioned, including several sprayers loaned by other projects; and supplies of spraying material, such as arsenate of lead and fish oil, are being accumulated at the storehouses.

Brush and debris burned.--Piles of brush and debris, accumulated during the fall and winter by thinning crews, are now being burned. The abnormally mild winter and light fall of snow has delayed burning operations until this month over much of the infested area, and the debris has absorbed so much moisture that burning is a slow process. It is the usual practice to burn at intervals during the year when weather conditions permit it to be done without danger to the surrounding vegetation. In order to avoid this dependency on the weather, portable machinery is being developed to convert the brush, branches, and debris into sawdust. This will enable the crews to dispose of the waste material immediately after it is cut.

Most egg clusters deposited in low situations.--Field reports from Massachusetts, Connecticut, and Pennsylvania indicate that, in many localities, 75 percent or more of the gypsy moth egg clusters deposited last summer are on rocks, ledges, brush, debris on the ground, and within 10 feet of the ground on tree trunks. Although this condition materially reduces the amount of climbing that must be done in order to creosote the egg clusters, it necessitates an extra careful examination of rocks, ledges, and debris, even in lightly infested territory, in order that no hidden clusters may be overlooked. Fortunately there has been little snow during the winter to interfere with the ground work.

State foresters in Pennsylvania to cooperate with Federal gypsy moth office.--According to a cooperative arrangement between the Bureau of Plant Industry and the Department of Forests and Waters of Pennsylvania, information concerning the gypsy moth has been sent to the inspectors and foresters of these departments throughout the State. They have been requested to send any specimens they may find, which they believe to be the gypsy moth, to the gypsy moth office at Wilkes-Barre.

Extreme care necessary in scouting property of powder works.--Unusual precautions are necessary in scouting the tree growth on the property of the Dupont Powder Works near Pittston, Pa. The area, comprising approximately 100 acres, is strongly fenced and closely guarded. Scattered over it are numerous magazines containing explosives and buildings for their manufacture. Company regulations are necessarily extremely rigid. By agreement with the company the work in this area is being done by specially selected and thoroughly reliable regular Federal and State employees. Seventeen gypsy moth egg clusters had been located and destroyed up to March 31, and the work is not yet completed.

Gypsy moth scouts concentrated in marshy areas.--Swampy areas in the mountainous sections of Pennsylvania and in some sections of Vermont were frozen over sufficiently in March so that reasonably satisfactory scouting work could be done. Workers were taken from other locations and concentrated in the boggy areas in order to accomplish as much as possible while the ground remained firm.

Experienced W. P. A. workers given preference in Vermont.--In accordance with his practice of cooperating in every way with the Department of Agriculture, the director of W. P. A. employment in the State of Vermont has instructed local W. P. A. offices throughout the State to give preference, in filling requisitions from the Department, to men who have had experience in the type of work to be done. By this method the Department will receive full benefit of the previous experience and training of the workers and the expense of training new men will be materially reduced.

Eradication work continues at Shawangunk and Putnam Valley, N. Y.--Federal W. P. A. and New York State conservation department employees engaged in gypsy moth work in the region of Shawangunk, Ulster County, N. Y., had intensively scouted approximately 11,500 acres of woodland and open country and 47 miles of roadsides, and had located and destroyed a total of 22,725 egg clusters up to March 31. In the Putnam Valley district, combined W. P. A., C. C. C., and regular employees of the New York State conservation department have destroyed approximately 59,900 egg clusters to date.

Special survey completed in New York.--Special survey work, which has been carried on in territory west of the barrier zone in New York since the inception of Federal W. P. A. gypsy moth work in that State, has been completed. Since July 1, 1936, this work has been done in a total of 488 townships or boroughs, located in the 31 western counties of the State. No infestations were located as a result of this survey work.

Ice storm hampers future gypsy moth work.--Trees on high elevations in some sections of Connecticut and lower New York State were damaged considerably by a storm on March 15-17. Ice formed on the trees in sufficient quantities to break many branches and tree tops. Examination of these trees will be more difficult in the future, as the fractures will offer ideal locations for the deposition of gypsy moth egg clusters, and the clusters will not be easily discernible from the ground.

Progress of C. C. C. gypsy moth work.--Since July 1, 1936, C. C. C. enrollees have destroyed over 5,197,000 gypsy moth egg clusters. They have scouted more than 918,000 acres, including approximately 4,590 acres where cleaning and thinning work was done. The tree growth along 2,486 miles of road and over 45,890 yards of stone walls were examined for egg clusters. This work has resulted in the apparent extermination of several small colonies, in greatly reducing the degree of infestation over many areas, and in rendering the growth at numerous sites much less susceptible to gypsy moth increase.

C. C. C. gypsy moth work hindered by reduction in trained personnel.--For the week ending March 27, an average of 1,446 C. C. C. men were employed on gypsy moth work east of the barrier zone, distributed as follows: Massachusetts 506, Connecticut 371, Vermont 452, and New Hampshire 117. This number will be materially reduced during April, as a large number of men left the camps at the end of the enrollment period and others are being transferred to camps in the West. It will be 4 or 5 weeks before the new enrollees will have reported to the various camps and received their training in gypsy moth work, and this will hamper the work in New England at a most important period of the year.

Changes in C. C. C. camps and regulations affecting gypsy moth work.--The C. C. C. camp at Unity, N. H., which was almost entirely a gypsy moth camp, was discontinued at the end of March. The camp at West Burke, Vt., is scheduled for abandonment at the end of April. A crew of 15 men from the Department of the Interior Veteran's Camp at Charlemont, Mass., will be assigned to gypsy moth work for the 6-month period beginning April 1. It is necessary to discontinue gypsy moth work in some sections as a result of a recent ruling to the effect that continued work cannot be carried on at distances from camp that cannot be reached in 45 minutes. Gypsy moth crews in the Connecticut camps have recently been equipped with fire-fighting apparatus, and the men have been instructed in its use. Training in fighting forest fires has also been given to the enrollees and foremen in some of the gypsy moth camps in Massachusetts.

Close supervision maintained over C. C. C. gypsy moth work.--During March all of the camps in Connecticut doing gypsy moth work under the supervision of the Bureau office were visited, as were several of the Massachusetts C. C. C. camps. Camp superintendents and gypsy moth foremen were interviewed, and visits were made to several areas where gypsy moth work had been done. Several locations were seen where the infestations would have caused severe defoliation next summer if they had not been cleaned up. In all cases where it is practical, emphasis has been placed on the removal of favored food plants so that these locations will be less favorable for the future increase of the gypsy moth. Clear cutting has been recommended at a few sites where gray birch or poplar are the only species present.

Progress of brown-tail moth work.--There were approximately 1,260 W. P. A. workers employed on brown-tail moth projects in the New England States at the end of March. Since July 1, 1936, these men have cut and destroyed more than 2,767,000 winter webs in Maine, New Hampshire, and Massachusetts. No infestations have been discovered in Vermont or Connecticut. Nearly 42,000 miles of roadsides were scouted and approximately 162,300 trees were cut. Over 20,704,000 trees were examined, principally in Maine, New Hampshire, Vermont, and Massachusetts.

Heavy brown-tail moth infestation found in Haverhill, Mass.--Scouting for brown-tail moth winter webs is progressing satisfactorily in the six New England States, although the discovery of unusually heavy infestations in some sections has necessitated more work than had been anticipated. One of these heavy infestations is located in Haverhill. The size of the area infested and the large number of trees, together with the density of the infestation, has made it advisable to employ six crews in cutting out the winter webs in that city. As many of the trees are tall, and the webs are beyond the reach of the ground crews, it is necessary to use additional crews of specially trained high-climbers. Large numbers of webs are being cut each week in Maine, New Hampshire, and Massachusetts but, if the weather remains normal, all of the territory should be completed before the end of the scouting season.

Infested towns on border of brown-tail moth quarantined area being rescouted.--In Massachusetts, all of the towns in Worcester County, both inside and outside of the quarantine line, have been scouted, as have all the towns in Norfolk and Bristol Counties, which adjoin the State of Rhode Island. Six towns in Worcester County, at the margin of the regulated area, were found to be infested by the brown-tail moth, as were four towns adjacent to the Rhode Island State line in Bristol County. The infested towns in these two counties, which are on the border of the quarantined area, are being rescouted in order to make doubly certain that all winter webs have been eliminated.

Light infestations found in Maine and Rhode Island.--Sixteen towns outside of the quarantined area in Maine were found to be lightly infested by the brown-tail moth. They were located principally in Hancock County. It is planned to continue scouting eastward until the limits of the infestation are determined. Infestations have been found in two Rhode Island towns that were infested last year, but the webs are considerably reduced in numbers. It is possible that these areas were reinfested from adjoining towns in Massachusetts.

No infestations found in Vermont or Connecticut.--Nearly all of the territory selected for brown-tail moth scouting in Vermont has been completed. No infestations were discovered. Scouting has been progressing in Connecticut since the first week in February but no infestations have yet been found.

PLANT DISEASE CONTROL

Many barberry bushes destroyed in northeastern Pennsylvania.--Approximately 2½ million barberry bushes have been destroyed in one infested area extending over 500 square miles in Lackawanna, Wyoming, and Susquehanna Counties, in northeastern Pennsylvania. Control work was first undertaken in this area in September 1935 and, according to L. K. Wright, in charge of the program in Pennsylvania, barberry bushes had become so numerous in many parts of these counties that they not only constituted a rust hazard but were considered a serious pasture pest. According to local residents, the first barberry bushes were planted in Pennsylvania about 1750 and there were few farms within these counties that were not infested with bushes, many of which were growing wild along fence rows and in pastures where seed had been scattered by birds. During the past year many farmers volunteered their services and the use of teams and trucks for transporting chemicals in order to expedite the eradication work.

Rust surveys in Nebraska to locate barberry bushes.--Locating the remaining scattered barberry bushes in Nebraska is the most difficult part of the clean-up problem. One of the methods being tried is to make a detailed rust survey each year to determine areas in which grain rust is especially prevalent early in the season. These surveys involve (1) exposing spore traps to determine the prevalence of spores in the air; (2) field observations made by Bureau representatives; and (3) reports submitted by property owners who have been selected to furnish data relative to the development of rust in their communities. According to M. E. Yount, in charge of barberry eradication in Nebraska, an attempt is being made to have at least one farmer in each township in the State make regular reports during the growing season, relative to rust in his grain fields. The value of the rust survey as a means of locating barberry bushes varies tremendously from year to year. If weather conditions are such that barberries rust heavily and numerous local epidemics of the disease develop, observations made during a single season may prove extremely helpful in locating remaining sources of inoculum. Barberry bushes destroyed in Cedar County, Nebr., in 1932 may be cited as a good example. During the survey made that year severe stem rust infection was observed on rye in the north-central part of the county and a crew of laborers was assigned to make a complete inspection of all uncultivated lands within the area where the rust was most prevalent, with the result that barberry bushes were found and destroyed on 30 different properties. A careful survey of Boyd County in 1936 resulted in the eradication of barberry bushes on seven different properties within an area where rye had rusted severely during the years 1932, 1933, and 1935.

Physiologic races of rust present serve as guide to source of inoculum.--In recent years there have been numerous instances throughout the Mississippi River Valley where severe local epidemics of stem rust were found to be definitely correlated with barberry bushes. By identifying in the rust laboratory at St. Paul the physiologic races of rust present in localized areas, it is often possible to determine whether the outbreak is due to inoculum carried in by the wind or to infected barberry bushes in the immediate vicinity of grain fields. Rust epidemics caused by local barberry bushes usually appear earlier in the season and when specimens are identified in the greenhouse they are apt to show several physiologic races. Infection occurring as a result of wind-blown inoculum appears later in the season and is usually characterized by a wide scattering of initial inoculum centers. When specimens of rust collected from these centers are identified in the laboratory the physiologic races known to have survived the winter in the South are the ones most generally present.

Changes on white pine plot 1 year following Ribes eradication.--The New Hope white pine area near Stevens Point, Wis., is an upland white pine hardwood type, with pine trees averaging about 2,000 per acre and varying in size from seedlings to poles, with a few scattered seed trees and some oak trees forming a broken overstory. The *Ribes* were all prickly gooseberry (*R. cynosbati*) and averaged about 200 per acre. They were eradicated in October 1935. At that time many young cankers were present on the pine and a study plot was established on the area to measure the effect of control work by obtaining data on the progress of the disease on the pine in this plot. The data taken in 1935 and 1936 gave the following results.

Year	Size of plot	Pines on plot	Living pines visibly infected with blister rust	Pines dead from blister rust	Pines visibly infected or killed by blister rust
	Acres	Number	Number	Number	Percent
1935---	0.6	1,382	652	29	49
1936---	.6	1,405	772	208	70

It will be noted that there were 23 more pines on the plot in 1936 than in 1935. These were seedlings that appeared during the year. Also, there was an increase of 299 in the number of visibly infected trees and trees killed by blister rust. The apparent increase in the number of infected trees is due to infections that took place in 1933 or 1934, but which did not become visible until 1936 because of the 2-3- year incubation period of the fungus on pines, during which the cankers were becoming large enough to be readily detected. The infections that took place in 1935 will become visible as cankers in 1937, when a further increase in the number of trees visibly infected on the plot may be expected, and this will be followed in later years by the gradual death of the infected trees. After that, the effect of *Ribes* eradication should be in evidence by the absence of further new infections on the pines. The protection of the healthy pines still remaining in the stand and of the new seedlings now developing will eventually result in an adequately stocked pine lot, notwithstanding the delay in *Ribes* eradication until after the blister rust had become so strongly established.

COTTON INSECT INVESTIGATIONS

Carry-over of pink bollworm larvae.--Examinations of open cotton bolls collected along the northern coast of Puerto Rico in November and December 1936 by L. C. Fife, of Mayaguez, showed that practically all of the larvae had completed development and that the carry-over of long-cycle pink bollworm larvae in bolls during the midwinter closed season for cotton was negligible. This is in contrast to conditions in 1935-36 when considerable numbers of resting-stage larvae were found. The explanation seems to be the difference in precipitation. The period from December 1935 to April 1936 was one of the driest on record, whereas during the same period in 1936-37 the rainfall was close to normal. The results of experiments also confirm this conclusion that moisture hastens pupation. During this period "Maga" (Montezuma speciosissima) and "Clamor" (Thespesia populnea) were important hosts and provided a continuous food supply. The infestation in Maga seed pods was 30 percent in November, 22 percent in December, 13 percent in February, and 11 percent in April. Although the percentage of infestation decreased from 30 percent in December to 11 percent in April, there were at least twice as many seed pods per tree in April and the actual decrease in population density was not great. Four mature larvae have been found in one seed capsule and about one-fourth of the infested pods contained two larvae each. The flower buds are also infested but not as heavily as the seed pods, the ratio being about 1 to 4. Buds are produced by Maga during the entire year but only a few mature seed capsules were found during September and they were not numerous until November. As most of the cotton fields had been cleaned and the old bolls burned by December 15, the presence of Maga seed pods filled an important gap in the sequence of host plants. The seed capsules of Clamor were found infested from September 1936 to March 1937. The highest infestation was 14 percent and the average about 4 percent, showing that the pink bollworm can also maintain itself on this host for 4 or 5 months in the absence of cotton. No other plants were found infested during the dead season for cotton. Control of the pink bollworm has been further complicated by the differences in planting seasons on the northern and southern coasts of Puerto Rico, and the laxity in enforcing the closed seasons. On the south coast the cotton crop is fruiting and maturing during the time of the closed season on the north coast; however, steps have been taken by the Puerto Rican authorities, on the Bureau's recommendation, to require uniform planting dates and closed seasons in the two sections for next year.

Thrips damage to cotton.--The variation in thrips injury to 40 different varieties of cotton was studied by E. W. Dunnam and J. C. Clark in experimental plots at Stoneville, Miss., last season. The four species of thrips causing the damage were Frankliniella tritici Fitch, F. fusca Hinds, F. runneri Morgan, and Sericothrips variabilis Beach. Single rows 120 feet long of each variety were planted in eight replicates. The plants in all the plots were thinned to approximately 12 inches in the drill. Six plots were thinned at the usual time and with an average of 2.79 plants per hill; in one plot thinning was delayed a week and an average of 2.03 plants left per hill; and one plot was thinned at the usual time with only 1 plant left per hill to allow full development. In the first series of plots an average of 9.24 percent of the terminal buds of the plants were destroyed by the thrips; in the plot where thinning was delayed a week 20.27 percent of the buds were destroyed; and in the plot thinned at the usual time, with only one plant left per hill, 21.02 percent of the buds were destroyed. Records were kept of the time of fruiting, the yield, and the grades of cotton on the injured plants and nearby normal plants for checks. There was only a slight delay in the first fruiting of the damaged plants, but there was an average delay of 10 days in setting 75 percent of the crop. Of the 40 varieties 26 showed an average decrease of 1.27 bolls per stalk on the damaged plants, and a loss in quantity of seed cotton. Two varieties had an equal number of bolls on the normal and damaged plants, but a loss in seed cotton. The other 12 varieties averaged a gain of 0.61 boll per stalk on the damaged plants; 6 of those produced a slight gain in seed cotton and 6 a loss in seed cotton. The greatest increase in number of bolls on injured plants for any variety was an average of 1.76 bolls per stalk over the normal plants. Of the 40 varieties under observation there was an average loss of 0.68 boll per stalk, or 7.72 percent on the injured plants. However, there was an average loss of 13.3 percent in weight of seed cotton, which showed there was also a decrease in the size of the bolls on the injured plants. The reduction in boll size apparently influenced the length of the staple, as it was shorter on the damaged plants in seven of the varieties. There was no boll weevil infestation in these plots and it is certain that the thrips loss would have been greater in the damaged plants if weevils had been present, because the bolls were produced later than in normal plants.

Arsenic absorption by plants.--Determinations of the amounts of arsenic in plants grown on soils treated with calcium arsenate have been reported by F. H. Tucker of State College, Miss. Analyses were made of corn, cotton, and soybean plants grown on seven soil types, to which 0, 400, 800, and 1,600 pounds of calcium arsenate per acre had been added. The plots were treated in April, the crops planted on May 3-14, and the plant samples taken on June 25, 1935. The results show the plants absorbed more arsenic on the plots that received the heavier applications, but not in proportion to the amount of soluble arsenic in the soil. Soil type seems to have had little if any influence on the amount of arsenic absorbed by the plants, although the corn plants grown on the Norfolk, Orangeburg, and Sarpy soils contained more arsenic than those grown on the other soil types. The maximum quantity of As_2O_3 found in any sample of corn was 5.8 p. p. m. for the plants from the Sarpy soil treated with 1,600 pounds of calcium arsenate per acre. The maximum for cotton was 10.0 p. p. m. for the plants from the Sarpy soil treated with 800 pounds of calcium arsenate per acre. The maximum for soy beans was 8.0 p. p. m. for the plants from the Memphis soil treated with 1,600 pounds of calcium arsenate per acre.

Cotton flea hopper emergence.--K. P. Ewing and R. L. McGarr report the first emergence of cotton flea hoppers from overwintering eggs in hibernation cages at Port Lavaca, Tex., on February 8, the earliest ever recorded at that laboratory. A total of 143 nymphs emerged in February as compared to none last year and five in 1935 from comparable cages. In March of this year 35,251 nymphs emerged, in comparison to 12,369 in 1936. The high temperatures during part of February and the first half of March caused the early emergence. During the 10-day period March 16-25, approximately 96 percent of the total emergence for February and March occurred. This warm weather was followed by a drop in temperature and a heavy frost, which killed all of the cotton above ground and caused a corresponding decrease in emergence. The first nymphs found in the fields were first and second instars on Croton texensis plants on February 15. The first flea hopper adult was observed on March 17. No flea hoppers were taken on flight screens during March. H. J. Crawford collected the first flea hoppers of the season at Brownsville, Tex., on February 25 and 26, when 36 nymphs including three in the fourth instar were taken on Tidestromia lanuginosa.

PINK BOLLWORM AND THURBERIA WEEVIL CONTROL

Wild-cotton eradication.--The eradication of wild cotton in southern Florida made excellent progress throughout March. By the end of the month all of the known cotton locations had been recleaned at least once since work was begun in the fall, with the exception of part of the Florida Bay and Cape Sable areas. One of the most encouraging features of the eradication program is the fact that very few seedlings were encountered in the four uppermost west-coast counties. A very unfavorable situation exists on Cape Sable. In a section known as Rollisons Prairie an enormous amount of open cotton was found on seedling plants. Original plans had been to reclean this section in January, but high tides flooded the flats and prevented crews from reaching this cotton. Excellent progress is now being made in recleaning this section. The crews first pick all of the open cotton by hand in order to prevent any of it being shattered to the ground as the plants are being removed. During the month 5,148 acres were recleaned and 47 mature, 160,492 seedling, and 155 sprout plants were removed. A first clean-up was made at five different locations involving only 8½ acres, which contained 73 mature and 448 seedling plants. In addition to the above acreage, 20,228 acres were scouted without finding any wild cotton.

Thurberia-plant eradication.--Very good progress has been made with the eradication of Thurberia plants in the Santa Catalina Mountains of southern Arizona. A total of 2,480 acres was covered and 59,752 Thurberia plants were removed. All of the work was carried on from the camp in Sabino Canyon. By the end of the month practically all of the territory which is readily accessible from this camp had been gone over, and plans are being made to establish a new camp site. At the end of March 99,265 acres had been covered in the Santa Catalina Range and 1,095,856 Thurberia plants had been destroyed.

Laboratory inspection.--The inspection of green-boll samples at the San Antonio laboratory has gone forward as usual, results having been negative to date. As regulatory duties decrease, inspectors at the various field stations have been devoting more of their time to the inspection of material collected within regulated areas. In the lower Rio Grande Valley of Texas inspections were completed the latter part of the month, only one specimen of the pink bollworm having been found. This finding did not involve any new territory, as gin-trash inspection had previously indicated infestation in the field in which this specimen originated. At El Paso, Tex., a good deal of material has been inspected, most of which was from Hudspeth County, and the results indicate a heavier infestation than the previous year. From 10 samples of 100 bolls each, 508 specimens of the pink bollworm were taken, as compared with 133 specimens from the same number of samples the previous year. A large percentage of the specimens were first- and second-instar larvae. At the other field stations the results have been negative to date.

The Big Bend of Texas.--In the Big Bend a special control program has been used for the past several years. This consisted in a thorough clean-up of fields in the fall, delayed planting of cotton the following spring, so that there would be no fruit until most of the moths had emerged, and the use of small plots of cotton to attract the late-emerging moths. Last fall a number of farmers in Presidio County indicated that they did not care to follow the delayed planting of cotton this spring. This made it inadvisable to carry on a complete field clean-up campaign last fall, and also because of a shortage of funds only the most heavily infested fields were cleaned. No effort has been made to get the farmers to observe the delayed planting date, which has been April 15, and the first cotton was planted on March 17. By the end of the month many of the farmers were planting. In Brewster County the same program has been in effect, but last year a farmer planted 10 acres early to see what the results would be. The cotton was very badly damaged by the pink bollworm and, as this farmer controls all of the cotton acreage in the county, this season he is observing the delayed planting. A trap plot of 1/2 acre was planted on March 8, and by the end of the month was up to a fairly good stand. As soon as the plot cotton begins blooming the blooms will be collected and inspected daily.

TRUCK CROP AND GARDEN INSECT INVESTIGATIONS

Calcium cyanide and nicotine compounds effective against aphid on greenhouse-grown vegetables and flowers.--C. A. Weigel and R. H Nelson, of the Beltsville, Md., laboratory, report that three successive overnight fumigations with calcium cyanide at intervals of about a week, using a dosage of approximately 3/16 ounce per 1,000 cubic feet, produced mortalities ranging from 96 to 100 percent of the aphid Myzus solani (Kalt.) pseudosolani Theo. on greenhouse-grown lettuce. These observations were made on infested lettuce plants growing in pots placed among lettuce plants growing in ground beds and under conditions simulating commercial greenhouse practice. The main crop was not allowed to become infested, and received four fumigations. Apparently no permanent injury was caused to the lettuce, although weak and stunted plants appeared to be more easily affected by the fumigant than the more vigorous plants. Two tests with a new commercial nicotine fumigation powder prepared especially for greenhouse use in pressure cans were also conducted in the same greenhouse, using 1 pound of the fumigation powder to approximately 21,178 cubic feet of space. This fumigant produced mortalities ranging from approximately 98 to 100 percent of the aphids (M. solani pseudosolani) present on several infested lettuce and tomato plants placed in the greenhouse during the exposure. No injury was observed on the major crop of lettuce and several hundred tomato plants which were subjected to the exposure. Two other experiments were performed in this same greenhouse with free nicotine (40 percent) at dosages of 152 cc and 125 cc, respectively, atomized into the atmosphere by means of a new nicotine vaporizer developed by the Division of Control Investigations. At the higher dosage this method proved equally as effective against the aphids as did the nicotine fumigation powder and at about half the cost of the latter. No apparent injury was caused to the lettuce, tomato, turnip, cabbage, and nasturtium plants growing in the greenhouse.

Additional breeding areas of beet leafhopper found in Texas.--V. E. Romney, of the Phoenix, Ariz., laboratory, reports that, as the results of a recent survey, additional breeding areas of *Eutettix tenellus* Bak., involving 2,700 square miles of territory were added to the known breeding areas north of the Rio Grande in Texas. This survey was performed primarily to determine the source of the curly-top disease epidemics in spinach fields. These epidemics have assumed critical importance in the Crystal City district of Texas. Survey data indicate that the source of the leafhoppers that infest spinach fields near Crystal City begins about 30 miles southwest of Dryden, Tex., and continues along the foothills up to the Rio Grande for approximately 360 miles. The beginning of the breeding area is apparently 180 miles west-northwest of Crystal City. Known breeding areas of the leafhopper now occupy approximately 10,700 square miles north of the Rio Grande in New Mexico and Texas, in addition to the unknown extent of adjacent areas in Mexico.

Chalcid parasite tested against greenhouse thrips.--Floyd F. Smith, of the Beltsville, Md., laboratory, reports the following results with the chalcid parasite *Dasyscapus parvipennis* Gahan, which is being utilized in the control of thrips, chiefly *Heterothrips rubrocinctus* Giard. in certain tropical countries. In cage tests, at a temperature of 80° F., it parasitized larvae of *Heliothrips haemorrhoidalis* Bouche and normal-appearing parasite adults emerged. The parasitized larvae apparently fed normally until fully grown, then they transferred to the first pupal stage before dying. The parasite caused only a slight change in the appearance of the host until the contents of the thorax and the head were consumed. At this stage the host body wall was separated between the meta- and mesothoracic segments and the parasite emerged. These effects on *H. haemorrhoidalis* differ considerably from those described for *H. rubrocinctus*. Incidentally, the larvae of the parasite were killed by fumigation with calcium cyanide at the rate of 1 ounce per 1,000 cubic feet, but all of the pupae survived and adults emerged therefrom. Based on experiments thus far, it appears that this parasite apparently required a higher temperature for optimum development than is maintained for the growing of most greenhouse crops, leading to the conclusion that it probably will not be successfully employed for the control of thrips in greenhouses.

Winter survival of tomato pinworm in southern California.--J. C. Elmore, of the Alhambra, Calif., laboratory reports that field observations during the month of March have demonstrated that *Gnorimoschema lycopersicella*

Busck has survived the winter in large numbers in southern California, even though the longest cold spell on record occurred in this area in January, including a minimum of 22° F. and a total of 17 nights during which the temperatures at Alhambra fell below freezing. Tomato fields were still in production early in December 1936, particularly in the San Onofre locality, and 80 percent of the fruits were infested. These fields were left standing until March 11, when they were disked and plowed. Prior to plowing, an average of five tomato pinworm adults per plant were found to be present in these fields. Heavy adult emergence from old tomato fields was observed at Alhambra and at Santa Ana during this same period.

Sweetpotato leaf beetle an important pest in North Carolina.--As a result of field observations and experiments performed in 1936, L. W. Brannon, of the Norfolk, Va., laboratory, reports that Typophorus viridicyaneus Crotch has developed into a pest of distinct importance in northeastern North Carolina. It has been discovered that half-grown larvae are sometimes present in sweetpotatoes 20 days after they are dug, providing an opportunity for the possible transportation of this insect in newly dug potatoes. Results of cage-toxicity experiments demonstrated that undiluted calcium arsenate was more toxic to the insect than was a derris or cube dust mixture containing 0.5 percent rotenone or a water suspension of ground derris root containing 0.02 percent rotenone. A dust mixture composed of cryolite and talc (60-40) was also highly toxic to this pest.

Cabbage webworm fails to survive winter in North Carolina.--W. A. Thomas, of the Chadbourn, N. C., laboratory, reports that extensive field studies performed during the period from January to March inclusive, have demonstrated that Hellula undalis Fab. failed to survive the winter of 1936-37 in the Chadbourn, N. C., district, although weather conditions in this district have been unusually mild, a minimum temperature of 22° F. being recorded. The present status of the investigations indicates that this insect does not pass the winter in North Carolina in any stage of its development, even when the weather is very mild.

INSECTS AFFECTING MAN AND ANIMALS

Diet for adult screwworm flies.--For feeding adults of Cochliomyia americana C. and P., to maintain a stock of these insects for experimental work, Roy Melvin, of the Dallas, Tex., laboratory, found the following mixture to be the most easily prepared, most economical, and the best food for the flies of all that have been tried: 250 cc of honey are added to 750 cc of hot water containing 50 g of gelatin; then 250 g of ground lean beef are added and the mixture is chilled and stirred occasionally until it starts to congeal. After the diet congeals it is ready to use. This recipe makes sufficient food for 8 to 10 cages of 1,000 flies each. The medium is placed on pieces of waxed paper in the bottom of the cage containing the flies and a water fountain and needs no attention for a week. It remains good for 3 weeks if kept in a refrigerator.

Effects of soil-and-debris accumulation over mosquito eggs.-- H. H. Stage and C. M. Gjullin, of the Portland, Oreg., laboratory, have found that many eggs of *Aedes* are laid at relatively high levels where normal floods do not reach. Perhaps the eggs are not flooded for a period of several years, in which case they are gradually covered with debris, particularly leaves, and sometimes soil. Tests have been made in the laboratory using soil samples containing eggs and covering such samples with varying depths of egg-free soil. The results were compared with check samples. Those samples covered with 1/2 inch of soil hatched but 2.8 percent of the eggs of *A. vexans* Meig. and 3.2 percent of those of *A. aldrichi* Dyar and Knab. After the egg-free soil was removed and the samples were dried and reflooded most of the remaining eggs hatched. Samples covered with but 1/4 inch of egg-free soil produced 47 percent *A. vexans* and 54 percent *A. aldrichi* larvae. It is probable that soil samples covered with a light covering of leaves and debris from one to several years old would show little or no reduction in the numbers of eggs hatching.

Influence of pH on hatching of mosquito eggs.--Preliminary tests made by Messrs. Stage and Gjullin have shown that eggs of *A. vexans* and *A. aldrichi*, flooded by neutral tap water might not hatch, whereas eggs hatched readily when flooded by an infusion of dead leaves. The pH of such infusions was 6.5 or less. Further work has shown that when soil samples are flooded with water made alkaline with calcium hydroxide to pH 8.6, a normal hatch occurred. The alkalinity of the water was reduced somewhat by acids developing from the soil of the sample, but the liquid was still alkaline after the eggs had hatched. It appears, therefore, that the eggs had acquired the ability to hatch by contact with the acid pH of the moisture in the soil before flooding or that some ingredient of the water, rather than its acidity, was responsible for causing the eggs to hatch.

Effect of daylight on development of mosquito eggs.--Samples of soil containing eggs of *Aedes vexans* and *A. aldrichi* have been kept in complete darkness and in varying numbers of hours of artificial light since the early fall of 1936. To date no appreciable difference has been noted in the numbers of larvae hatching when such samples were flooded. Interesting data on this have been obtained from eggs laid under controlled conditions. One hundred and sixty-two *A. vexans* eggs were laid by fed females in the laboratory in August 1936, and 10 days later were placed under out-of-door conditions in complete darkness. During February 1937, approximately 180 days later, the eggs were brought to the laboratory, warmed, and flooded. All eggs hatched with the first flooding. These eggs had not been exposed to daylight for more than a few minutes during the 180-day period.

FOREIGN PARASITE INTRODUCTION

Predacious elaterids shipped to Mauritius.--During the period from October 1936 to January 1937 a total of 11,281 field-collected larvae of *Pyrophorus luminosus* Ill. were shipped by K. A. Bartlett from Puerto Rico to Farnham House Laboratory, for forwarding to Mauritius. Of this number

8,127 reached England alive and were repacked and shipped to the final destination. The costs of these collections were defrayed by the Mauritius department of agriculture. *Pyrophorus* is predacious on white grubs in Puerto Rico and is being colonized in Mauritius against *Phytalus smithi* Arrow, a destructive pest of sugarcane.

FOREIGN PLANT QUARANTINES

Entomological interceptions of interest.--Two living larvae of the Mediterranean fruit fly (*Ceratitis capitata* Wied.) were taken at New Orleans on November 11, 1936, in an orange in ship's stores from Brazil. A living specimen of *Echinothrips mexicanus* Moult. arrived at Brownsville, Tex., on October 13, 1936, on a gardenia in cargo from Mexico. Living adults of *Callosobruchus ademptus* (Sharp) were taken at San Francisco on January 7 in seed of kudzu bean (*Pueraria thunbergiana*) in the mail from Japan. A living specimen of *Frankliniella formosae* Moult. arrived at Baltimore on October 10, 1936, on a leaf of Japanese cabbage (*Brassica chinensis*) in ship's stores from Japan. This represents the first record in our files of this thrips being intercepted. Living adults of *Callosobruchus chinensis* (L.) were found at Washington, D. C., on December 29, 1936, in dried beans in the mail from British Guiana. Living larvae of the turnip gall weevil (*Ceutorhynchus pleurostigma* Marsh.) were intercepted at Philadelphia on December 28, 1936, in rutabaga (*Brassica campestris*) roots in ship's stores from the Netherlands. A living adult of the weevil *Brachyrhinus scaber* L. arrived at New York on November 6, 1936, on soil around gladiolus corms in baggage from Germany. A living specimen of the cicadellid *Opsius stactogalus* Fieb. was taken at Brownsville, Tex., on January 4 on a rose cutting in baggage from Mexico. A living adult of *Baris chlorizans* Germ. was intercepted at Port Arthur, Tex., on December 22, 1936, in a turnip in ship's stores from France. This weevil is reported as severely infesting cabbage and cauliflower in Poland.

Pyralid in St. Johnsbread.--A living larva of *Myelois ceratoniae* Zell. was intercepted at New Orleans on December 30, 1936, in a pod of St. Johnsbread, or carob (*Ceratonia siliqua*), in a cargo shipment from Cyprus. C. Heinrich reports that this species is found throughout the entire Mediterranean region, in Africa, Madagascar, and Puerto Rico. *M. decolor* Dyar, which is a synonym of *M. ceratoniae*, occurs in Florida, Central America, French Guiana, and the West Indies. The hosts include almond, walnut, tamarind, loquat, and quince.

Pink bollworm in okra.--Living larvae of the pink bollworm (*Pectinophora gossypiella* Saund.) were intercepted at New York on January 19 in okra (*Hibiscus esculentus*) pods in the mail from the Virgin Islands. On June 26, 1936, a living larva and a dead pupa of the pink bollworm were intercepted at New York in the "webbing" together of several seeds of sunset hibiscus (*Hibiscus manihot*) in a shipment in cargo from Brazil.

Pathological interceptions of interest.--Some of the interceptions listed here appear to be new species of fungi, others are on new or unusual hosts or from countries new to our interception files. *Ascochyta conorum*

P. Henn. was intercepted on *Picea excelsa* cones in baggage from Germany on March 8 at New York. *Botrytis narcissicola* Kleb. was intercepted on narcissus bulbs from Holland on September 30 and October 1, 1936, at New York and from England on December 3 at San Francisco. *Cercospora nicotiana* E. & E. was intercepted on tobacco leaves in cargo from Cuba on February 10 and from the Philippine Islands on March 24 at New York. *Cercospora* sp., no species found listed on host, probably new, was found on leaves of *Tradescantia* sp. from Mexico on September 22, 1936, at Eagle Pass. *Cladosporium vignae* M. W. Gardner was found in a cargo shipment of black-eyed peas from Cuba on February 3 at Miami. *Coniosporium* sp., unlike species reported on bamboo, was found on a bamboo stake in a shipment of plants from Canada on November 17, 1936, at Seattle. *Didymella* sp., unlike species described on rose, was intercepted on manetti rose stocks from Holland on December 9 at New York. An immature ascomycete, apparently of the genus *Didymella*, was found on October 6, 1936, on *Cereus chlorocarpus* from Peru offered for entry under special permit at San Francisco. *Diplodia cacaoicola* P. Henn. was found on *Cucumis anguria* in baggage from Virgin Islands. We have had no previous interceptions of the fungus on any species of *Cucumis* or *Cucurbita*. *Diplodiella oryzae* Miy. was found on rice hulls in stores from Japan on March 16 at New York. *Gloeosporium pruinosum* Baeml. was intercepted on February 6 on *Veronica guthricana* from England at the inspection house in Washington. *Helminthosporium allii* Campanile was intercepted on garlic from Peru at New York on March 11. Mosaic was found on Swiss chard leaves from Italy on February 5 at New York. *Mycosphaerella citrullina* (Smith) Gross. was found on pumpkins from Australia on February 10 and on vegetable marrow from New Zealand on March 4 at Norfolk. *Nectria* sp. was intercepted in a shipment of water chestnuts (*Eleocharis tuberosa*) from China on March 9 at New York. *Paraphelenchus pseudoparietinus* Micl. was intercepted in New York September 11, 1936, in narcissus from Holland. A disease of rice hulls from Japan intercepted at New York last July has been tentatively determined as *Phaeoseptoria oryzae* Miy., although the spores are rather short for the species. A species of *Phoma* intercepted at San Francisco on April 24, 1936, on *Hoodia* spp. (or *Huernia Bainnii* and *H. zebruna*) and *Taveresia Bainnii* from South Africa could not be determined. Additional material was received and has been studied. The species has not been determined, but is not *P. stapeliae* Kalch. & Cke. *Phomopsis batatae* (E. & H.) Harter and Field was intercepted on January 25 at New York on sweetpotatoes from Japan. *Phomopsis* sp., no species described on *Cymbidium*, was found causing a leaf spot of *C. pendulum* from India on May 11, 1936, at San Francisco. *Phyllosticta* sp., unlike any species reported on rice, was found on rice straw from Ceylon on April 30, 1936, at New York. The *Puccinia* on bamboo from China mentioned in the March 1, 1937, News Letter (vol. 4, no. 3, p. 19) has been assigned to the species *P. mitriformis* Kusano by Dr. Cummins, with notes covering discrepancies between the specimen and the description of this species. *Puccinia sorghi* Schw. was found in a cargo of corn from Argentina, first interception from South America, on February 2 at New York. A *Sclerotium* sp. found in shipments of narcissus from Holland last fall at New York is thought to be the form called "small scale-speck" reported from England by Alcock and from the United States by McWhorter and Weiss. *Septoria acicola* (Thum.) Sacc.

was intercepted on pine needles from Germany on December 18, 1935, at New York. Diseased passion fruit from Maderia Islands intercepted February 3 at New York bore fruiting bodies resembling those of Phomopsis but with hooked stylospores only. The fungus is very close to what has been called Septoria fructigena B. & C. A tomato severely disfigured by "Streak", a virus trouble, was intercepted at Nogales on February 23 among tomatoes from Mexico. Uromyces lespedezae-procumbentis (Schw.) Curt., so called (see News Letter, vol. 4, no. 3, March 1, 1937, p. 20) was intercepted February 25 on leaves in seed of Lespedeza formosa from Japan in cargo, at Seattle. Volutella sp., unlike any described species apparently, was intercepted on February 25 at Baltimore on sour oranges (Citrus sinensis) from Japan.

Rot of melons from Chile.--A sterile fungous rot of melons from Chile, intercepted on a number of occasions at New York and reported as Sclerotium bataticola Taub. on page 20 of the News Letter dated July 1, 1935 (vol. 2, no. 7), has now been determined as Rhizoctonia bataticola (Taub.) Butler by the specialists who have been studying the disease. R. bataticola has been reported from different parts of the world but its identity and the limitations of the species are a matter of controversy. The disease was found at New York on one or more melons in several shipments from Chile and Argentina during March.

DOMESTIC PLANT QUARANTINES

No canker found at old infection center.--A thorough reinspection was made in Jefferson County, Tex., during the last week in March of an area where 625 trees infected with citrus canker of several years' standing were discovered on 6 properties in the winter of 1935-36. No disease was found in the recent reinspection. Properties adjoining the infected area were reinspected and, while it appears that the disease may have been eradicated, repeated inspection of the area will be continued. Thirty-three inspectors are employed in making reinspection of all other citrus-growing districts of Texas, Louisiana, Mississippi, and Alabama.

Peach mosaic control work.--Preliminary to starting eradication of abandoned and diseased peach trees in New Mexico, 4 inspectors are completing a presurvey of peach-growing properties in the infected counties of the State, the peach mosaic disease having been located in 10 counties in the Rio Grande drainage area of the State in the field season of 1936. Tree-removal work was carried on in the infected districts in California throughout the winter. The 1937 inspection work will be started in Arizona, California, Colorado, New Mexico, and Texas in April.

Colorado establishes quarantine on peach mosaic disease.--Effective March 15, the State of Colorado placed a revised quarantine prohibiting the movement of host plants of the peach mosaic from the infected area in that State, unless accompanied by a State certificate showing a disease-free zone of 5 miles around the nursery and the source of budding wood. Quarantines relating to the disease have also been placed by Arizona, California, Oregon, Utah, and Texas.

Change in field headquarters for phony peach disease control.--The field headquarters for phony peach disease control were recently moved from Atlanta, Ga., to Little Rock, Ark., with offices at 410 National Standard Building, 212 Center St. A. E. Cavanagh is the project leader.

Work on phony peach disease control.--The project leader reports that since the reduction of the relief force from 900 to 700 men in March, he has received more requests for tree removal, and even more enthusiastic support of the work, than heretofore. Eradication was conducted during the winter in Alabama, Arkansas, Georgia, Illinois, Missouri, North Carolina, South Carolina, Tennessee, and Texas, comprising the removal of about 2,000,000 peach trees a month. The work is being completed or closed in several counties and a concentrated drive made to remove worthless peach trees from the vicinity of infected properties, nurseries, and commercial orchards, taking advantage of the blossoming season to readily find the wild trees.

Enormous production in pine-growing nursery.--"Ten million seedling trees will be the annual capacity of the Savenac nursery, near Haugan, Mont., which provides the forest planting stock for the northern Rocky Mountain national forest region, upon completion of current improvement work", according to the American Nurseryman of March 1, 1937. This is one of the Forest Service nurseries in which five-leafed pines are protected by the Bureau from white pine blister rust, as a prerequisite to interstate movement under the provisions of Quarantine 63. "Established in 1909", the article states, "the original nursery comprised 26 acres. By the new development work, already more than half completed by C. C. C. labor, the area will be extended to 90 acres. It is said that 170,000 acres of land needs to be planted in the region, so there is 15 years' work ahead. The nursery output is about 45 percent ponderosa pine, 35 percent western white pine, and 20 percent other species, such as Douglas fir and spruce."

Transit inspection activities.--Supplementing the regular force, some 20 men have assisted in transit inspection in the spring nursery stock shipping season at Chicago, Omaha, Kansas City, St. Louis, Indianapolis, Detroit, St. Paul, New York, Springfield, and Boston. Six of the men are State inspectors and the others have been assigned for seasonal work from projects of this Bureau relating to Japanese beetle, European corn borer, barberry eradication, and white pine blister rust.

Cincinnati's March shipping approaches Christmas peak.--With passenger trains operating in two sections, storage mail averaging more than 700 feet daily, line loadings of freight cars showing a weekly increase of more than 1,000 cars, and express showing a similar increase, the volume of traffic through Cincinnati is similar to that of the Christmas season, the inspector reports. Nursery stock shipments were seen from about 40 States.

New map-illuminating device.--A new type of frame for illuminating maps of field activities was recently devised by J. M. Corliss, transit inspector in charge of Middle Western stations. The aluminum frame holds maps

64 by 44 inches. Colors are effected by pasting green and red Scotch cellophane on the back of the map to indicate field activities. When the lights in the frame are turned on, these colors make a brilliant display. The frame and tripod are collapsible, and can be carried or shipped in the specially constructed case of light fiber.

Pink bollworm quarantine regulations revised.--Effective April 6, the regulations of the pink bollworm quarantine were extended to include Sierra County, N. Mex., and the Texas counties of Crane, Loving, Upton, and Winkler, in the lightly infested area. While the principal industry of these counties is stock raising, a small amount of cotton is grown and this is moved into the present adjacent regulated areas for ginning. This action is therefore taken to allow the movement of seed to farms and ranches in these counties for planting and feeding purposes.

INSECTICIDE INVESTIGATIONS

New publication on Tephrosia.--Derris and cube have come into extensive use in recent years as agricultural insecticides. Figures recently issued by the United States Department of Commerce show that during 1936 this country imported 913,277 pounds of crude derris root, 695,222 pounds of crude cube root, and 944,099 pounds of ground timbo, the total valued in excess of $350,000. Assuming an average rotenone content of 4.5 percent, this quantity of derris and cube root would make 15,315,588 pounds of insecticide dust containing three-fourths of 1 percent rotenone. This strength has been found effective for the control of cabbage worms and the Mexican bean beetle. Another genus of leguminous plants, namely Tephrosia, contains rotenone, deguelin, and the other insecticidal constituents of derris and cube, but to a lesser degree. About 150 species of this genus are known and they are distributed all over the world except in Europe. Twelve species of Tephrosia have been found to contain rotenone or deguelin and 15 species show insecticidal value when sprayed on aphids or certain other insects. Certain specimens of Tephrosia virginiana, called the devil's-shoestrings, from Eastern Texas, have been found to contain 4 percent crude rotenone. Efforts are now being made by the United States Department of Agriculture, in cooperation with the Texas Agricultural Experiment Station, to propagate high rotenone strains of Tephrosia virginiana. All the data concerning those species of Tephrosia found to have insecticidal value are reviewed in a recent publication by R. C. Roark, entitled, "Tephrosia as an Insecticide--A Review of the Literature", B. E. P. Q. E--402, 165 pp., Feb. 1937).

BEE CULTURE

Steps to protect bees from insecticides.--Frank E. Todd, of the Pacific States laboratory at Davis, Calif., reports that the California State Department of Agriculture has held a hearing concerning a regulation to govern the spread of insecticides. One of the aims of the regulation is to insure beekeepers and stockmen better information as to when and where dusts are to be applied. The hearing was well attended by beekeepers, insecticide manufacturers, and airplane dusters. The meeting undoubtedly gave all parties concerned a better acquaintance with the various problems, and it is expected that a solution fair to all sides may eventually be accomplished. The more practical side of what the beekeeper is to do to protect his property was not covered.

Special introduction method reduces non-laying period of package queens.--A. P. Sturtevant, of the Intermountain States laboratory at Laramie, Wyo., reports that the most significant result found during the past quarter in the analysis of data accumulated during the supersedure studies on package bees shows that an average of 4.2 days was required for 549 package queens to begin laying, when established by the usual methods, whereas queens introduced in 20 packages by a special method began laying within 12 to 20 hours.

IDENTIFICATION AND CLASSIFICATION OF INSECTS

Bruchid added to National Collection.--Specimens, identified as *Bruchus hamatus* Miller by H. S. Barber, were recently received through the Division of Foreign Plant Quarantines. They emerged from legume seeds coming from Turkey in connection with activities of the Foreign Plant Introduction Division of the Bureau of Plant Industry. *B. hamatus* is one of the least-known species of the genus and its food plant has not been recorded. Unfortunately, the seeds making up the sample from which the present specimens emerged represented several different species of plants, making definite determination of the host impossible.

Erroneous sawfly host record corrected.--In the course of some preliminary studies of the North American species of sawflies belonging to the genus *Neodiprion*, Grace Sandhouse has discovered that *N. abietis* (Harris) does not occur on spruce (*Picea*), although it has been so reported during most of the period since its description in 1341. Studies of series of specimens reared from fir (*Abies*) and spruce show that two distinct species are involved. The form occurring on spruce is apparently undescribed. It may be recorded, incidentally, that, according to Miss Sandhouse, another seemingly undescribed species of *Neodiprion* occurs on *Pinus resinosa*, specimens having been received from Maine and Massachusetts.

Another European leaf-hopper recorded from United States.--Specimens of a *Macrosteles* (*Cicadula* auct.) collected at Puyallup, Wash. (from *Equisetum* growing along the river, July 5, 1935, Oman) have been tentatively identified by P. W. Oman as *ramigera* Zachvatkin, a species described from the North Caucasus region of the Union of Soviet Socialist Republics. The Puyallup specimens agree with Zachvatkin's description and illustrations of *ramigera*, which has unusual characters in the internal genital pieces of the male.

Specific differentiation in certain leaf hoppers.--In connection with the determination of some leaf hopper material belonging to the genus *Macrosteles* (*Cicadula* auct.), P. W. Oman has had occasion to examine critically a considerable number of European specimens of the *sexnotata* complex. H. E. Dorst, in a paper now in press, points out that the North American species *divisa* Uhler is not identical with the European *sexnotata* Fallen, as

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has been supposed, and gives some characters for the differentiation of the two forms. Mr. Oman's observations confirm Mr. Dorst's conclusions and bring to light an additional structural difference in the two species. This difference is in the sternal apodemes at the base of the abdomen of the male, which, in *sexnotata*, are well developed and prominent, but in *divisa* are rudimentary. The same character will also differentiate *divisa* from *fieberi* Edwards and *laevis* Ribaut, which are European forms belonging to the *sexnotata* complex.

A new grass coccid record.--An Asiatic grass coccid, *Antonina indica* Green, has been identified as present in America on the basis of specimens from *Echinochloa colonum*, collected at Santiago de las Vegas, Cuba, on February 1, 1937, by S. C. Bruner, and submitted by him for determination. The species has been reported previously from India, Formosa, Sumatra, Ceylon, Hawaii, Philippine Islands, and Kenya, Africa.

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